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ABSTRACT

The Environmental Education Project Center has developed these guidelines for teaching a unit in environmental studies. It is their intention that the teacher and student cooperatively plan the approach and content to be used during the course of study. In this unit about land, teacher resource information and student material are combined to form a teacher's manual for use in the intermediate grade levels. Project objectives, behavioral objectives, and pre- and post-test questions introduce the unit sections followed by ideas, actions, and/or activities to develop awareness of land and its uses. Major topics of discussion range from plants and animals associated with soil to litter, control measures, and resource use. Field trips emphasizing concepts previously learned are suggested and additional sources of information and materials for both students and teachers are listed. This work was prepared under an ESEA Title III contract for the project "Operation Survival Through Environmental Education." (BL)

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E N V I R O N M E N T

INTERMEDIATE

Idea I

Land

T E A C H E R M A N U A L

Title III
ESEA

"Operation Survival Through
Environmental Education"

Environmental Education Project

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ENVIRONMENTAL IDEAS
FOR THE STUDENT
-Land-

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I N T R O D U C T I O N

to

ENVIRONMENT Idea I Land

INTERMEDIATE
RESOURCE UNIT

The Title III, Environmental Education Project Center is providing your class with the following materials to teach a unit on land.

Student Manuals - 1 per student
Teacher Manual - 1
Supplementary Materials (as requested by the classroom teacher)

It is the project's intention to provide guidelines for the teacher and student to cooperatively plan the approach and content to be used during the course of study. All or part of the material can be used after evaluating the needs of the students.

The Environmental Education Project is evaluated by meeting objectives as outlined in the original project proposal. The resource units are written to meet these project objectives with additional material deemed necessary by the project staff, area teachers and administrators, and local environmental concerns.

A summary of the project objectives is provided to inform you of the areas being evaluated concerning the land unit. When using the curriculum materials, we urge you to teach toward these objectives.

- decrease in leaf burning
- decrease in use of trash burning barrels
- decrease in burning off areas of vegetation cover on fields
- decrease in use of pesticides in the homes, the gardens, and the fields
- decrease in the number of pounds of litter on a 50 foot section of Wood River Creek
- increase in use of litter bags in automobiles
- increase in the purchase of soft drinks in returnable containers

- increase in classroom use of films and filmstrips on environmental education

- increase in books and magazines relative to environmental problems checked out of school libraries and instructional materials centers

- increase in number of subscriptions to periodicals and other publications relative to environmental education

Students and families of students involved in the project are evaluated on the basis of the above stated objectives. Any different approach that you and/or your students might conceive that will further develop these objectives will be most welcome at the Project Center.

A concept-activity file is constantly being formulated at the Project Center to supplement the resource unit. Additional activities should be evaluated and used to increase motivation and interest depending on the students' background.

The concepts as stated in the original proposal are further stated in the field trip section. These concepts are primarily concerned with the land unit. Additional concepts should be developed to meet the needs of the individual teacher and students at the appropriate grade level.

Behavioral objectives are necessary to devise a method of evaluation and proper instruction. The following behavioral objectives are listed as a basis to follow in the teaching of the land unit. Additional objectives should be devised by the teacher as they apply to the individual needs of the students.

1. Students will be able to list examples of how man is dependent on natural resources.

2. Students will explain in an oral or written manner how humus is formed.

3. Students will conduct a study to compare rich soil with poor soil.

4. Students will illustrate the interdependence of all living things by writing out an example of a food chain and completing a chart on the food web.

5. Students will list ways that man can recycle solid waste.

A pre-test and a post-test must be given to each student. The pre-test is made up of four parts. One part is found at the beginning of each section. As a student begins studying each section, he should answer the questions provided on a separate sheet of paper; you should retain these papers until the post-test is given at the end of the entire unit.

This type of construction allows the teacher to choose individual sections of the unit. The complete post-test related to all subdivisions of the unit is provided so that the test can be duplicated for each student to complete. After completion of the pre- and post-test, please grade and provide the Project Center with the test results. We would prefer the percentage gain for each student. Provide this necessary information by completing the teacher evaluation form.

The teacher's manual uncludes the actual student guide plus guidelines for the teacher to use while instructing students. Actions 5 and 6 are for your use in conducting field trips and determining what resources you want to use.

Not included in the teacher's manual are the transparency masters and the charts/forms for student use. These items are included in the teacher packet of supplementary materials. This arrangement will allow you to make multible copies to distribute to your students. You are invited to obtain a teacher packet on a loan basis from the Title III Center. Our telephone number is 618-786-3313.

ENVIRONMENTAL IDEAS

FOR THE STUDENT
-Land-

Teacher's Answer Key

Directions: grade the student responses using the following key. Look for key words and be flexible. For ease of tabulating results, let each question have a value of five points.

1. Man is dependent on land (soil) for all plant growth, food, open space, and minerals; on trees (plants) for a source of all energy; and on animals for food, recreation, and maintaining a balance in nature.

2. Soil is necessary for plant growth, ground cover, and water holding.

3. Humus is another name for dead and decaying material.

4. Topsoil is approximately six to eight inches in depth.

5. One inch of topsoil takes approximately 500-1000 years to form.

6. Erosion is the process of moving soil from one place to another, usually by wind or water.

7. Soil that is exposed to the natural elements is very likely to erode.

8. Soil is a renewable natural resource.

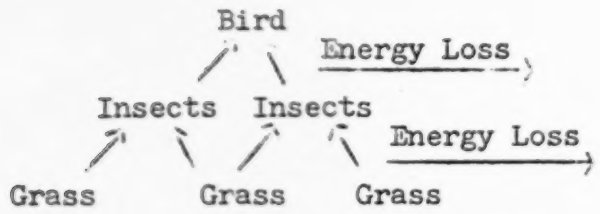
9. Animals must get energy, minerals, and vitamins from plants. Animals also receive shelter for protection and shade from plants.

10. Any food chain must have a producer, consumers, and possibly decomposers. One example would be:

    grass ⟶ aphid ⟶ ladybug ⟶ decomposers

11. An animal's habitat is where he lives, his immediate environment.

12. Use the following diagram to explain the insect-bird relationship:



To receive the needed energy the bird will have to consume a great number of insects because of the energy loss. Note: this answer would have to be toned down for intermediate students.

13. Solid waste is any material thrown away such as litter, by products, and non functional items.

14. Approximately five pounds of solid waste per person is thrown away daily.

15. To find out the amount of solid waste disposed of by your family, you could take a home survey.

16. Three methods of disposal are:

a. sanitary landfill
b. incineration
c. open dumps

as well as;
d. recycling program

17. Incinerators melt or burn solid waste in order to dispose of the material.

18. At a landfill solid waste is compacted and buried.

19. Recycle means to reuse materials and return non-functional items to the production line.

20. The answer should be yes. All citizens should be concerned because we are cluttering our countryside with litter, we are running out of places to put out solid waste, and there is increased apathy on the part of most Americans.

ENVIRONMENT

Idea 1

Land

ENVIRONMENTAL IDEAS FOR THE STUDENT

This guide to environmental ideas is written for you in order to give you a better understanding of some of the environmental problems you will face in the future. It is also written in such a way that you will be able to make your own value decisions about what has to be done to maintain and improve the world in which you and all of us live. The interest that you have is directly related to the amount of involvement that you give in the solution to the problems of our surroundings.

This guide will be used by other students after you. Please keep it in good shape: avoid marking in it or other misuse. Use notebook paper for answering questions, copying charts, or other tasks called for on the following pages.

ENVIRONMENT

Idea I
Land

Action I

Where Are They All Going?

Resources that is. We are running out of many natural resources. These are called limited resources. When resources like coal and oil run out, there will be no more.

Unlimited resources are those resources that will be with us forever. For example air, water, and soil are unlimited natural resources. However, even though they are unlimited, we must take care of them so they will be fit to use.

A. Is Man Dependent on Natural Resources?

The emblem on the right shows air, water, land, a tree, and a bird. All of these items are natural resources. <u>On a separate sheet of paper show how man is dependent on air, water, land,(soil), trees,(plants) and animals, by writing a brief story.</u>

Your teacher will keep these stories until you are finished with the unit on land. Then you will look back and talk about some of the things you might have overlooked.

B. What If Man Misuses These Natural Resources?

Man already misuses much of his resources. Land is lost to pavement. Highways, cities, and airports are taking over ½ million acres of farmland a year. There are over 100 species of wildlife on the endangered list. We will run out of key minerals (oil, lead, zinc, uranium) in 30 years, if we continue using them at present rates.

Man must learn to manage natural resources wisely by reducing the amount he now uses, reusing products, and recycling discarded objects.

ANIMAL CRACKER
LYLE, DID YOU HEAR THEY'RE GOING TO FILL IN THE LAKE--
--AND BULLDOZE 250 THOUSAND TREES AND LEVEL THOSE HILLSIDES?
BUT, WHY?
--THEY'RE PUTTING IN AN EIGHT-LANE SUPER HIGHWAY.
--WHAT FOR?
--THEY SAY THAT IT WILL ENABLE MORE PEOPLE TO GET OUT AND ENJOY THE SCENERY.

C. Happiness Is A Nice Place To Live

A nice place to live is a place where the air is clean, the water is clear, and the land is beautiful. We can have all these things if man will use the resources he has wisely. Government and industry are making progress in cleaning up our environment and managing our air, water, and soil; but it is everyone's responsibility for conserving the air, water, and soil around him. We must know what our resources are and how to manage them.

Your class and your teacher might discuss the possibility of inviting a speaker to come to your classroom and talk with you. There are many people in your community who manage our resources. They would be very happy to speak to your class. Here are some possibilities:

Soil Conservation Service.

Soil and Water Conservation District Chairman.

Agricultural Extension Adviser.

Illinois Federation of Sportman's Clubs.

Garden Clubs of Illinois.

Audubon Society.

Game and Fish biologists.

Illinois Forestry Department.

TEACHER'S GUIDE

ACTION I

Part A, B & C Here are some suggestions you might want to consider using to further emphasize man's limited resources and unlimited resources.
Student-teacher involvement in decision making is very important.

1. Use the Coca-Cola Ecology Kit (Rescue in Space) to illustrate the need for maintaining proper management of our resources; i.e. air, water, food, and space. This simulation game is available through the Title III, Environmental Education Project Center.

2. Use a slide series on man's misuse of his natural resources. A carousel tray with the slides and a taped narration are available through the Title III, Environmental Education Project Center, or develop your own slide show.

3. Have students prepare a bulletin board with pictures showing the resources of his community.

4. The pre-test is the story written about man's dependence on resources. Do not give any guide-lines on writing the story. At the end of the entire unit, another similar test will be given to measure percentage gain. Since this is the land unit, look for these points in the story:

   Dependence on land(soil): essence of all plant growth, food, open space, and minerals.
   Dependence on trees(plants): source of all energy.
   Dependence on animals: food, recreation, especially maintaining a balance in nature.

5. The addresses and phone numbers for the resource people are located at the end of this teachers' manual. Get the details on times available, topics covered, and any cost involved by phoning these people. Most resource people are more than happy to visit your classroom.

ENVIRONMENT Idea 1 Land

Action 2

This Land Is Our Land!

Soil is one of our most valuable natural resources. It is also one of the most widely mistreated resources. If we are to conserve our natural resources (and it is everyone's responsibility), we must know why they are so important and how to take care of them. We know why air and water are important, so let's look at land and why it is important.

A. What's the Problem?

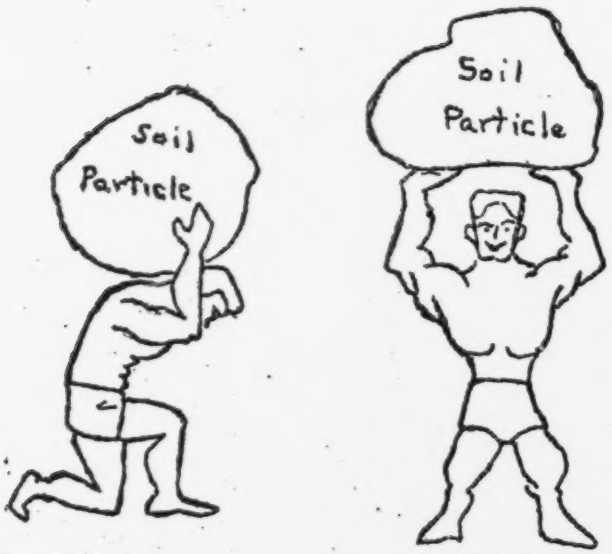
The problem is we don't think about the environment; or maybe we don't know enough about the environment to think!

We need to know why the land we live on is important. <u>On a piece of notebook paper, answer these questions:</u>

1. Why is soil necessary?
2. What is another word for dead and decaying plant and animal material and organic wastes?
3. How deep is the average topsoil?
4. How long does it take nature to form one inch of topsoil?
5. What is a good definition of erosion?
6. What soil conditions allow erosion to take place?
7. What kind of natural resource is our soil?

Your teacher will keep your papers until you finish this unit.

B. Rain, Rain Go Away...



Pick-up Carry

In order for our land to be beautiful, it must have cover. In order to have good ground cover, it must be good soil. Without a cover the soil will wash away with every rain. If the thin layer of topsoil washes away, plants cannot grow. If the land becomes barren, it will be very difficult to restore. It takes about 500 years for nature to form one inch of topsoil. Topsoil is only six to eight inches on the earth's surface.

C. Why Is Topsoil So Important?

Topsoil contains many plants, animals, soil particles, and humus.

How is this valuable topsoil formed? Soil itself is formed by the weathering of rocks; but more important is the rich organic material in the soil. Very primitive plants begin to grow, like lichens, mosses, and ferns. It is these plants, as they live and die, which make possible the animal life that will soon follow them.

But after a short length of time these first plants and animals will die and other plants and animals will follow them and die. And so the cycle continues. However, as we know, the remains of these plants and animals do not just pile up. These, too, are broken down into simpler parts which in time return to the soil, air and water. This decay process is caused by bacteria, molds, and fungi which are called decomposers. As the decomposers work, they produce humus which is the name for the dead and decaying plant and animal material. In addition, organic wastes are needed to make soil.

You should not burn your leaves. They should be composted or simply mulched with a lawnmower and left on the yard. As the leaves decompose, they will return valuable organic material back to the soil. This organic material is called humus.

D. A Handful of Soil

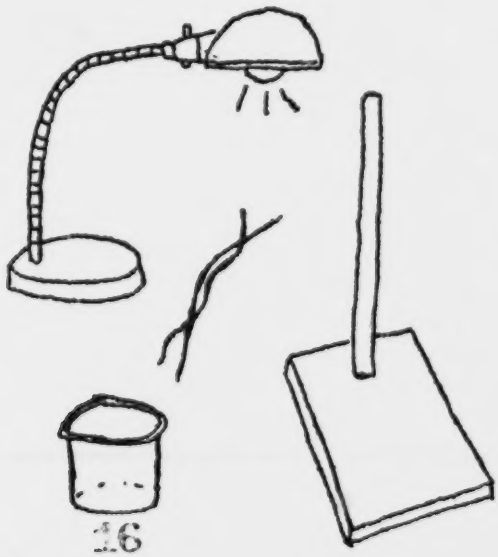
Would you like to see some of the things found in soil? If so, follow these steps:

1. Find a covered area on the school ground and collect a piece of moist topsoil about 4" x 4" x 2". Leave the grass, leaves, and soil together.

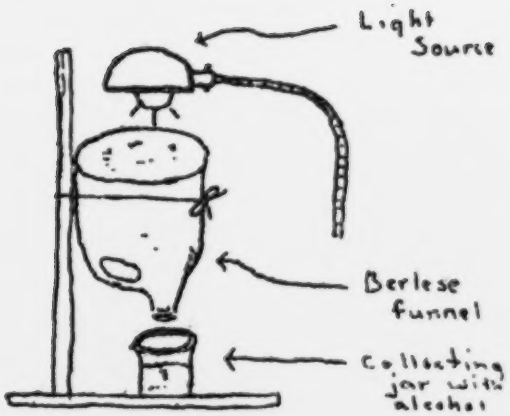
2. Notice the different plants that grow in the soil. Use your senses and feel the soil, smell the soil, and observe as many things as possible. Do not destroy any plants or animals at this time.

3. Take a one gallon plastic bottle, such as a liquid bleach bottle and cut off the bottom about 3" up. Save the bottom for latter classroom use.

Also get the following items: a ring stand, a beaker or a small jar filled with alcohol, a lamp of some kind, and some string or wire.



4. Assemble these items as in the diagram at the right. The funnel you have made is called a "Berlese" funnel. Place your sample of dirt in the funnel and leave for several days. As the dirt dries out from the top, the various organisms in the soil will move farther down and eventually drop into the beaker (or collecting jar).



5. After several days, observe the animals that came from the soil. A microscope would be very useful as many of the animals are very small. Are any of these animals harmful? Why are plants and animals important in the make-up of good soil?

6. Some of the larger organisms that you might find are worms, mites, centipedes, snails, ants and termites.

Some of the microscopic organisms might be bacteria, fungi, and protozoa (single celled animals).

E. What Can We Do?

Now you know that plants and animals are necessary for the soil. Man often makes the conditions very bad for plants and animals to live in the soil. If we understand what man does to the land to abuse it, we might figure out some ways to prevent this from happening. From your bookmobile, library, instructional materials center, or any resource material, find out some ways that man has mistreated the land. Also find ways that man can prevent some of these things from happening in the first place. You might want to choose a major topic for which to be responsible:

AGRICULTURE
--farming
--raising livestock
INDUSTRY
CITIES
PARKS AND RECREATION AREAS
CONSTRUCTION
HIGHWAYS

If you are unable to find written materials on these subjects, look for slides, filmstrips, pictures, or just discuss in class the mistreating of our land and preventitive measures.

Once you find out what man does and some ways man can prevent these things from happening, see what you can do to conserve our land.

Take a survey of your lawn at home. Copy the following chart and give your lawn a grade! Use any grading method that you choose. As a class, survey the school grounds. At the end of the survey, take an average grade on each item!

As a class think of some measures you can take to improve conditions on your school yard. Here are some suggestions:

1. Establish a nature center on your school property. This will allow wildlife to visit your school and will be an excellent place to study the environment.

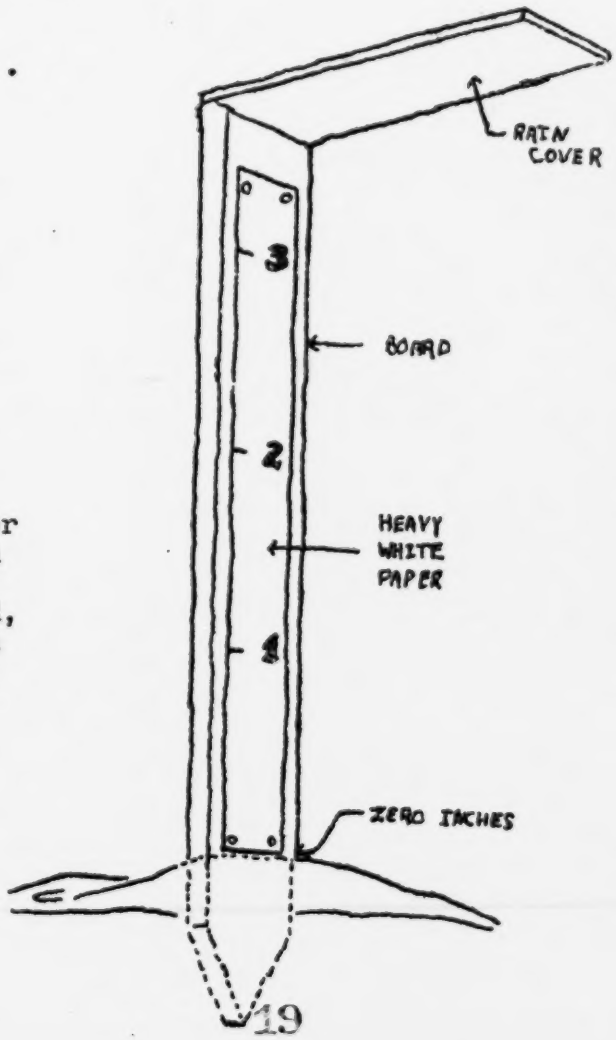
2. Rope off an eroded area and plant grass seed, or other ground cover.

3. Plant trees and shrubbery around the school yard. Many species of trees can be obtained from your Forestry Department at a reasonable cost.

4. Establish a compost pile in an inconspicuous area. Ask your principal if he will make arrangements for the custodian to put all leaves, grass cuttings, etc., into this area. Learn how to take care of this compost pile.

F. Splish, Splash...

You know that bare soil will wash away often and faster than soil covered with plants, gravel, or other ground covering. Since topsoil is so important, we must keep it where it is. To show you the difference between bare soil and covered soil, and how water can carry it away, we are going to use a splashboard. Use the diagram at the right. Put one splashboard in grassed soil, compacted soil, gravel and sand. You can either wait until it rains, or you can use a sprinkling can or garden hose. If a garden hose is used, make sure the water spray falls on top of the splashboard like rain falling on it. Repeat as often as desired. Save test papers for comparison or display purposes.



THE SOIL

I am the soil that lies beneath your feet.
Without me, no heart could ever beat.
To man, to plants, to bird and to beast.
I give life to all--down to the least.

Of all the world's beauty, I'm the fountain;
It flows from me, from valley to mountain.
All blossoms receive their color from me;
Creating beauty for all people to see.

All my elements, makes a world that is green,
Which in bright sunshine has a special sheen.
Sustenance for all creatures I will provide,
So on this earth, they in good health can abide.

When I am left bare, I am apt to stray;
Wind and water will carry me far away.
Without cover, I'll become harsh and hard,
And rushing waters will leave me scarred.

But if a green carpet of plants clothes me,
Then the winds and rain can never harm me,
And when the plants die, to return to the earth;
They'll produce new growth in next spring's rebirth!

Bertil O. Youngquist

TEACHER'S GUIDE

ACTION 2

Part A. The answers to the pre-test questions are found at the end of this teaching unit before Action 6. Keep the student's test papers for measuring student gain after administering the post-test.

Part B. Consult your Science textbook for experiments on erosion, or devise your own. The Title III Project office has a concept activity file which might be helpful concerning activities.

Part C. Several words in this section may need explanation. Here are some definitions:

Topsoil - surface soil, approximately six to eight inches.

Organic - anything derived from living organisms.

Lichens - algae and fungus plants living together, usually on rocks.

Mosses - small green plants growing in moist areas; spongy in appearance.

Decomposers - organisms that aid in the decay of organic manner.

Humus - the organic part of the soil.

Compost - a fertilizing mixture composed of leaf mold, manure, lime, etc.

TEACHER'S GUIDE

ACTION 2

Part D. Two or three set-ups should be sufficient for an entire classroom study of the organisms obtained. CAUTION: Do not use too much soil as it will take a long time to dry out. A few leaves or grass clippings in the bottom of the inverted bottle will keep the soil particles from falling into your alcohol container.

Check with your library, bookmobile, or IMC for books and reference material on identification of plants and animals in the soil. You could draw some of these organisms on a transparency for student use.

A number of follow-up activities can be helpful: writing and/or reading stories about the soil and all the organisms that are necessary, a study of earthworms and the role they play in the mixing process, and growing plants in good soil versus bad soil, water versus no water, or light versus dark areas can be valuable.

It is quite interesting to let the students have a part in the planning of activities. They learn from making errors.

Included in the packet of material provided by the Title III Center are transparency masters for your use in making overhead visuals to further stress soil and its properties. Simply run the master with a transparency film through the Xerox copy machine. Use felt tip pens to color the transparencies if desired.

TEACHER'S GUIDE

ACTION 2

Part. E. Some direction from you is necessary to start the students on the right track. Becoming aware of the problems is more important than criticizing their lawn or school yard. Show them some positive steps to take and if possible carry through long term projects.

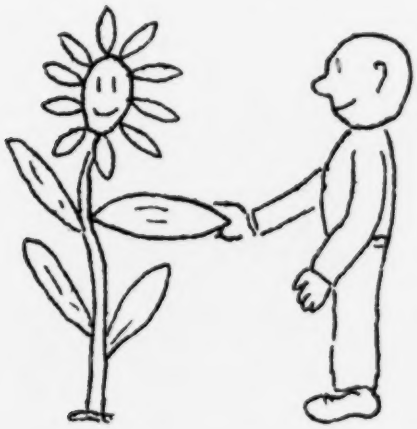
Part F. The grading system can be A, B, or C; good, fair, or poor, or any system that the students choose to use. This activity can be very interesting and meaningful. Have selected students make the boards out of old wood from home. It does not have to be elaborate to be effective. Make as many boards as you have student volunteers. At least four or five are necessary. The rain cover can be made by folding a 5 x 7 card and tacking one edge on the board. The resulting paper should be saved and compared with other results. A bulletin board display may be a useful way of relaying the message.

The paper from the splashboards located in the grassed area, gravel, wood chips, mulch, etc., will have some low splash marks, but they will not be muddy in appearance. The paper from the bare and compacted soil will have muddy splash marks high on the board. This illustrates the eroded effect of water on uncovered soil.

"The Soil." This poem can be analyzed or used as a take-off for other activities; e.g. writing poems, stories, and songs about soil, land, resources, erosion, or countless other topics.

ENVIRONMENT Idea 1 Land

ACTION 3



"Have You Thanked a Green Plant Today?"

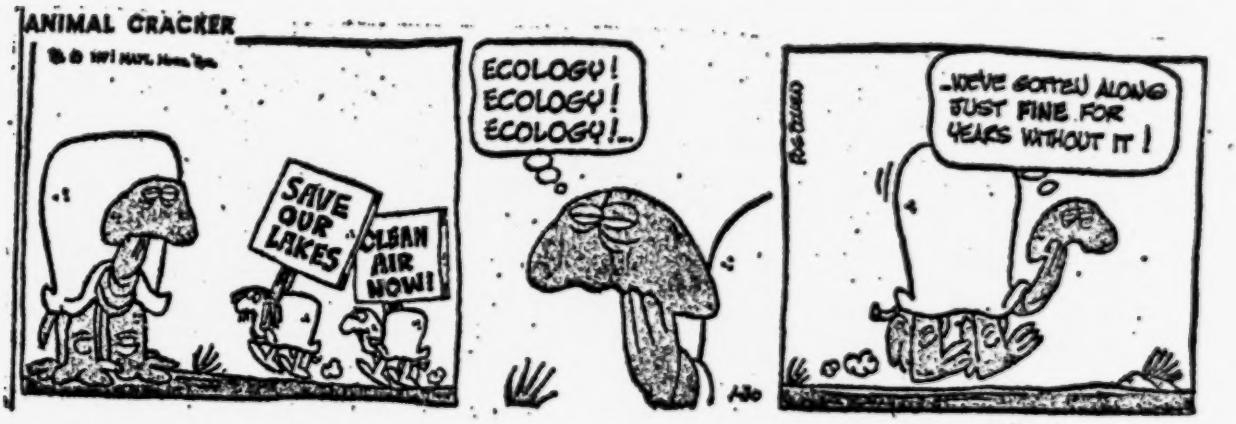
Today is a good day to begin; but why should we thank a green plant? Answer these questions on a separate sheet of paper and then we will begin discovering!

1. What are two important things that animals must get from plants?
2. What is an example of a food chain?
3. What is an animal's habitat?
4. Why are there usually more insects than birds in a forest?

A. Home, Home on the Range...

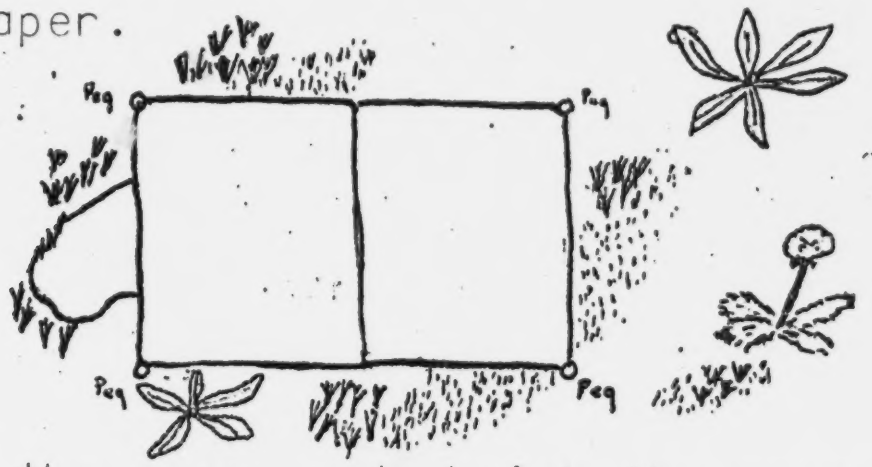
Of course, this is where the deer and the antelope play. The range is their home or habitat. What is your habitat? What animals did you find in the soil habitat that you have studied? Let's study a small area of land and find out what living things make this area their home.

You will need two pieces of paper that the teacher will provide.
You will need four pegs (ice cream sticks or old pencils will do).
You will want something hard to write on and a good sharp pencil.

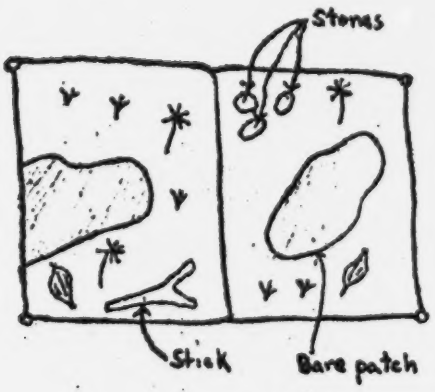


Follow these steps:

I. Choose an area that is not completely covered with plants. The teacher will give you two sheets of paper. Put the pegs at each corner of the two sheets of paper.



II. Lift the paper and sketch the area within the four pegs. Use symbols for the kind of plant:



Symbol	Name of plant
V	Grass
	Plantain
*	Dandelion

III. On the back side of your two sheets of paper, list all the plants and animals in this small area. Try not to disturb the animals, but examine them as closely as you can. A magnifying lens might be helpful.

IV. Questions to be answered:

1. What was the smallest number of animals observed on any one plot
2. Does the plot of land have more or less plants than most of the other plots?
3. Does that plot get more or less sun than the other plots?
4. What was the largest number of animals observed on any one plot
5. Does the plot with the most animals have more or fewer plants than most of the other plots?
6. Does the plot get more or less sun than the other plots?
7. Is there any other way in which it is especially different from the other plots?

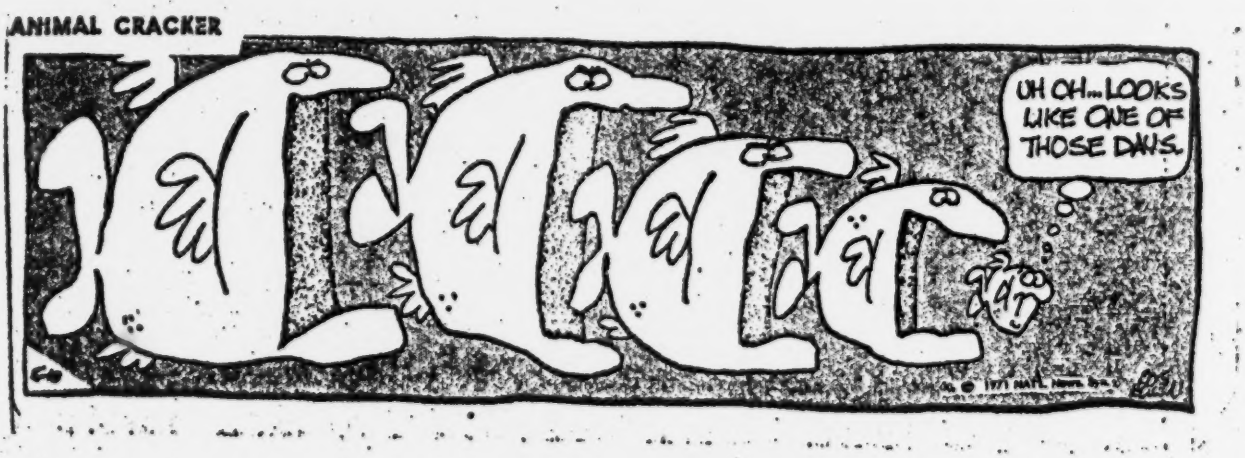
B. Little Animals-Medium Animals-Large Animals

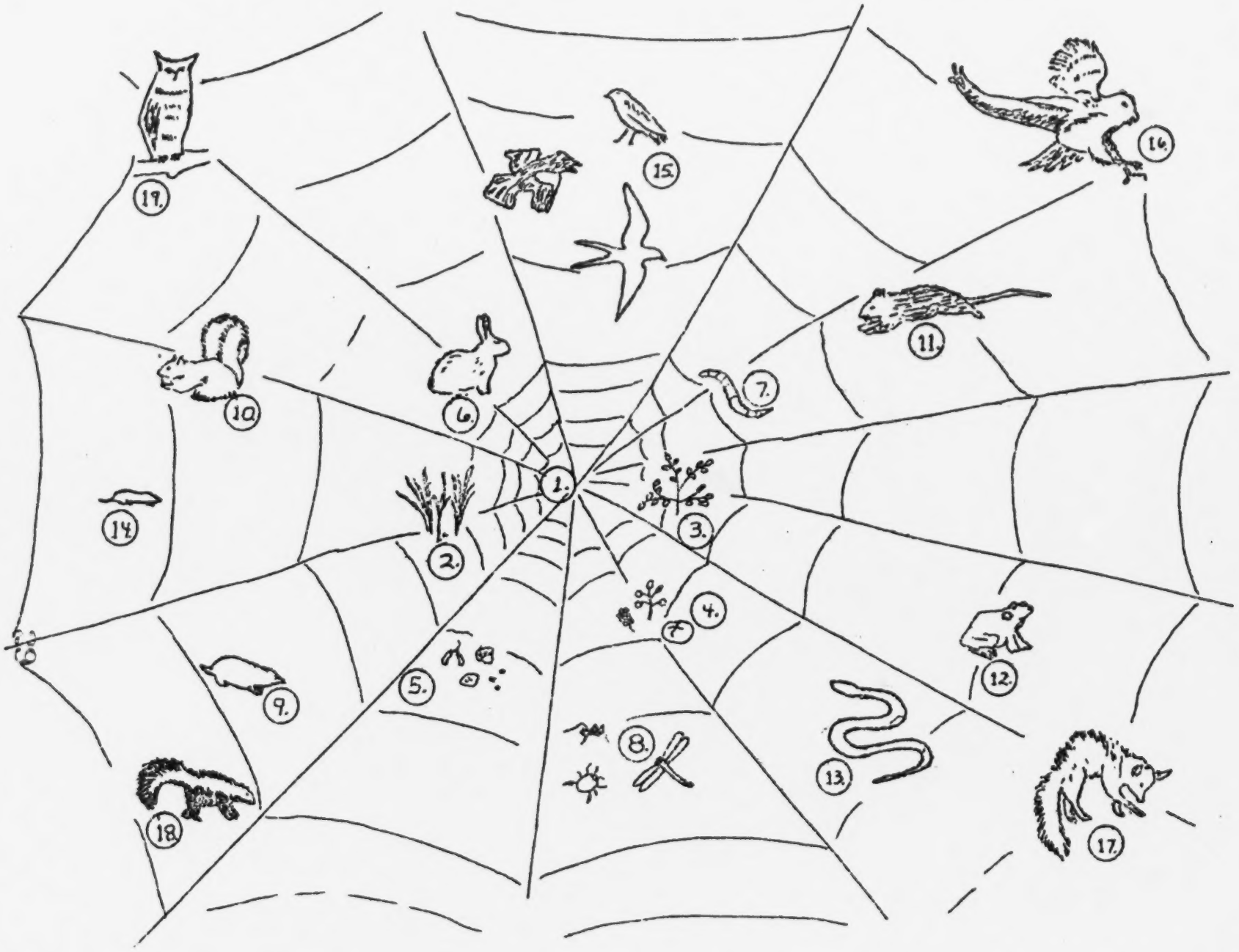
By now you should know that some animals depend on plants and some animals depend on other animals in order to live. This dependence on other living things can be shown by forming a food chain.

A green plant always comes first because all energy comes directly or indirectly from green plants. Green plants are the living things that can make their own food. These are called <u>producers</u>. <u>Consumers</u> come next. These are animals that depend on green plants. Other consumers will feed on these first consumers. Use the plants and animals from your plot of land to form a food chain.

C. Everything Is Linked Together

Complete the <u>food web</u> that your teacher will give you. It is very complex, but this is what is found in nature.




1.
2.
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17.
18.
19.

D. E-C-O-L-O-G-Y!

After working with the plants and animals and their habitat, you should be able to tell everyone what ecology is. By knowing something about ecology, we should know what happens when man does something to destroy natural things. Choose a topic, read some available material on the subject, and write a paragraph.

1. How does man fit in the food web?

2. What is the ecology of a forest?

3. How does erosion upset the balance of nature?

4. How can a roadside dump harm the ecology of the surrounding area?

5. What relationship is there between ecology and pesticides?

6. What happens if an animal is removed from a food chain?

TEACHER'S GUIDE

ACTICN 3

Part A. This activity will provide the student with the idea of the interrelationship of plants and animals and their environment. Each student should be responsible for a plot of land. You should provide each student with two charts (Plants on the Plot of Land and Animal Record and Weather Record). The Weather Record should be very general. Under the title of general conditions, have the students observe whether it is dry or humid, sunny or hazy, etc. The condition of the soil should be wet, moist, dry, compacted, loose, or any other condition the student observes. These two charts will be the reverse side of the drawing the student makes. Help students obtain a variety of plots, (e.g. bare spots, trees, shrubs, mud puddle, etc.,

Magnifying lens can be borrowed from the Title III Environmental Education Project Center.

Compile all data gathered by each student and answer the questions presented in section IV. Additional student activities can be suggested by the student and carried through with your approval. Check with your bookmobile, library, or IMC for reference books on the identification of plants and animals.

Part B. Let the students devise as many food chains as they can think of from their study of the plot of land. Examples of food chains are:

Grass → Aphids → Lady bugs

Humus → Earthworm → Robin

Be able to explain that green plants are the ultimate energy source. Decayed material would contain stored energy.

Part C. Have the food web duplicated and give each student a copy. Instruct students to draw all possible lines that show what animals are dependent on other animals for food. A completed copy is provided to assist in the explanation for the students. Realize that lines will be going in every direction, and the diagram will be complicated. The whole idea is interdependence. You might ask how man is involved in this web of life. A transparency might be helpful in the explanation.

Part C. (Cont.) The diagram illustrates a food web found in a forest. Arrows should be added to show what animal eats what food. Use the information below to add arrows throughout the food web.

1. Decaying plants
2. Grass
3. Plants
4. Fruit
5. Nuts and seeds
6. Rabbits eat 2, 3
7. Earthworms eat 1
8. Insects eat 2, 3, 4, 5, 8, 12
9. Moles eat 3, 5, 7, 8
10. Squirrels eat 2, 3, 4, 5
11. Mice eat 3, 4, 5, 8
12. Frogs and toads eat 7, 8
13. Snakes eat 7, 8, 11, 12, 13, 14, 15
14. Shrews eat 3, 4, 5, 7, 8, 9, 11, 12, 13
15. Birds eat 4, 5, 7, 8
16. Hawks eat 6, 8, 11, 12, 13, 14, 15
17. Foxes eat 4, 6, 8, 10, 11, 12, 13, 15, 18
18. Skunks eat 3, 4, 8, 9, 11, 12, 13, 15
19. Owls eat 6, 8, 9, 10, 11, 14, 15, 16, 18

Part D. Teachers!

Use your discretion here and provide guidance. The resource section, Action 6, will provide available material that you can gather for student use.

You might want to introduce an ecology song. This tune is sung to the tune of M-O-T-H-E-R.

<u>E-C-O-L-O-G-Y</u>

E is for environmental problems,
C is for control we haven't used,
O is for the odor that surrounds us.
L is for the laws we've failed to use.
O is for the oxygen that's scanty,
G is for the graves we're going to fill,
Y is just for you-you're so important
to help promote Ecology!

ENVIRONMENT Idea I Land

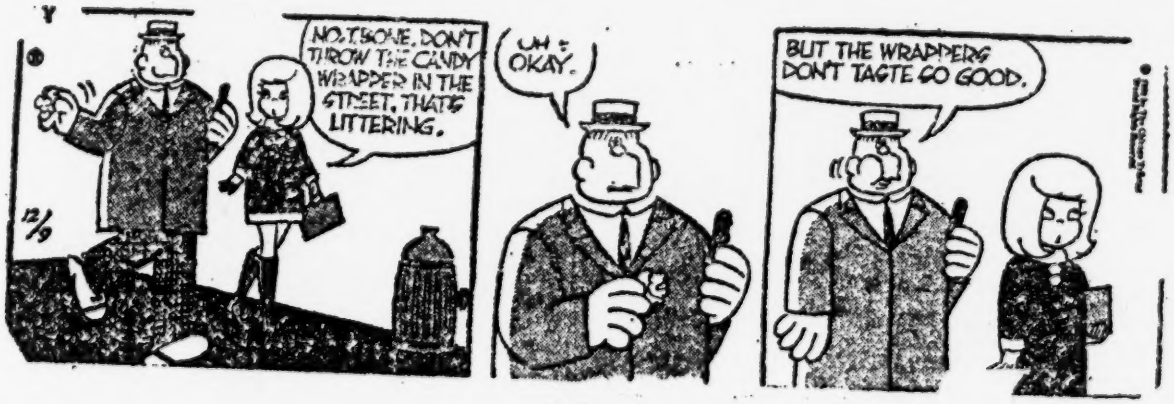
ACTION 4

The Problem Is Solid Waste

Now that we know some principals of ecology, we should look at some of the problems that our environment faces. One problem is solid waste. Solid waste is anything that is thrown away by man. Litter is the result of people throwing solid waste on the ground or in the water. This is a problem!

On a piece of notebook paper, answer these questions.

1. What is solid waste?
2. What is the average amount of solid waste thrown away by each individual daily?
3. How can you get an idea of the amount of solid waste your family throws away in one day?
4. What are three methods of solid waste disposal on a community basis?
   1.
   2.
   3.
5. What does an incinerator do to solid waste?
6. What happens to solid waste at a landfill?
7. What does recycle mean?
8. Should you as a citizen be worried about solid waste? Why or why not?



A. A Throw Away Society

Every individual throws away about 4½ pounds of solid waste a day. An example of what this country threw away during the year 1970 is:

7 million automobiles
48 billion tin cans
26 billion no-deposit, no-return bottles
35 million tons of wood fiber
15 million tons of glass

A home survey will give you an idea of the amount of solid waste your family throws away in one day. Your teacher will give you a form that you can use to record the solid waste disposed of in one day.

Make sure each member of the family keeps a record. At school, have another chart and write down all the things you throw away; such as candy wrappers, scrap papers, etc.

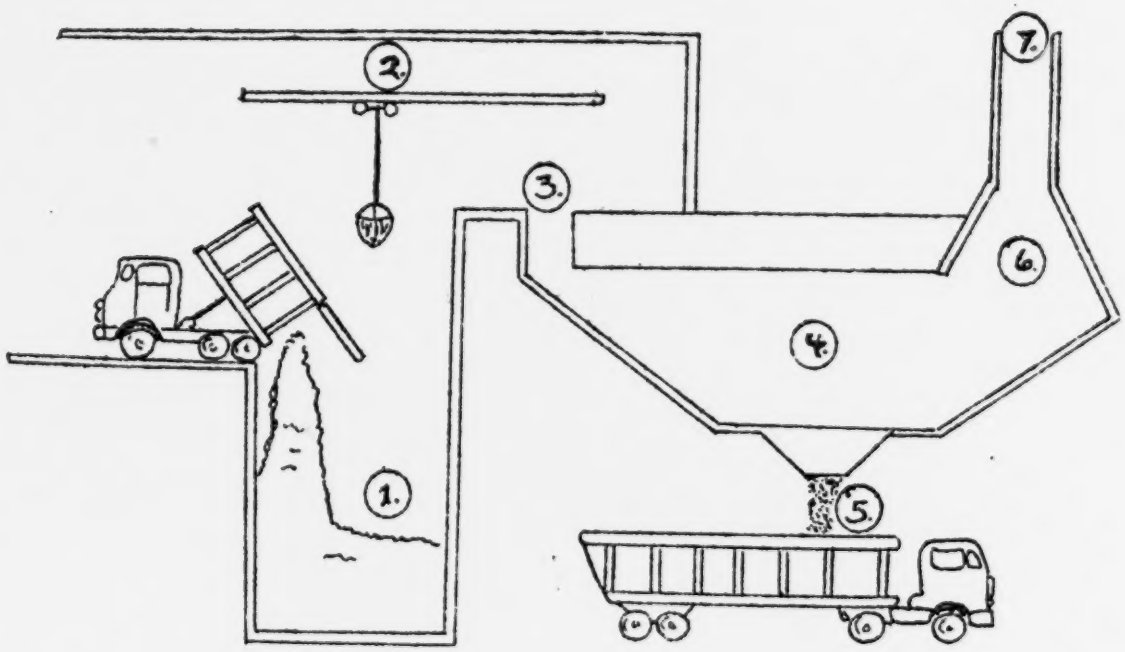
Determine how much solid waste material is discarded by the entire class. Make a class chart showing this amount. Is there any way that this amount could be reduced?

B. Where Does It All Go?

It all goes to a dump, incinerator, or landfill.

A dump is an undesirable method to dispose of solid waste because of odor, unpleasant appearance, disease, rats, and air pollution.

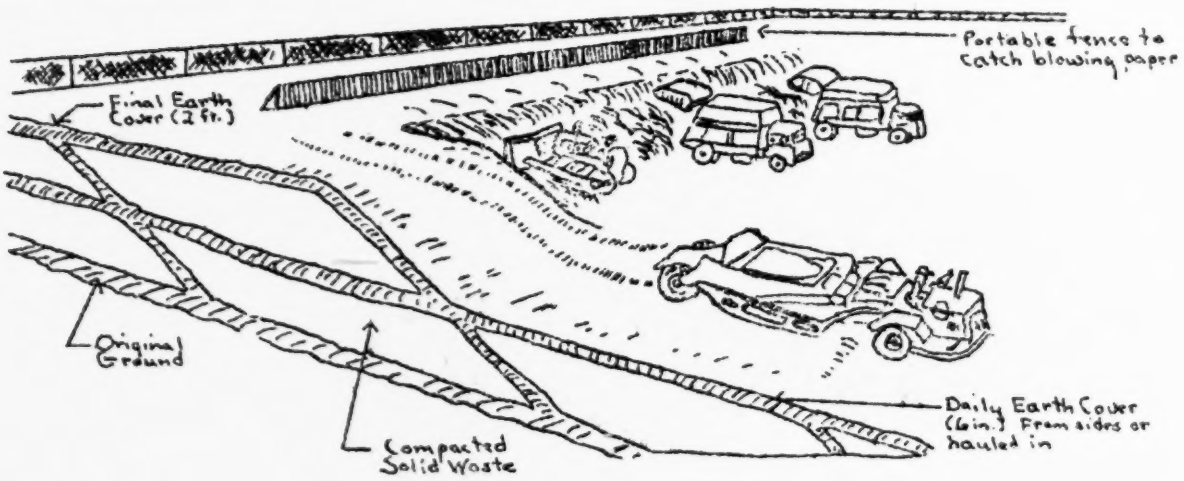
An incinerator usually causes air pollution and destroys the possibility of reusing any material. Most large cities have incinerators where they burn all the city's refuse. Cities use incinerators because of limited space.



INCINERATOR

1. Storage bin (Pit)
2. Crane
3. Hopper
4. Fire Chamber
5. Ash Removal
6. Cyclone Dust Collector
7. Smoke Stack

A landfill has good possibilities for efficient waste disposal, but can be a nuisance. A landfill buries solid waste in layers in the earth. No recycling occurs in a landfill, so everything gets buried. A landfill also requires a great deal of land.


Portable fence to catch blowing paper
Final Earth Cover (2 ft.)
Original Ground
Compacted Solid Waste
Daily Earth Cover (6 in.) From sides or hauled in

SANITARY
LANDFILL

C. Reduce! Reuse! Recycle!

Let's look at the tremendous amount of excess packaging found on items in a grocery store. Your teacher will give you a form to be completed. Write in the kind of packaging each item has. Under observation write whether the packaging can be reduced, reused, recycled, or none of these.

Grocery stores are not the only places you will find excess packaging. Many places are guilty of this, department stores, clothing stores, even the school cafeteria. As a class, discuss how many items can be reduced, reused, or recycled.

Take positive steps in dealing with these problems. Start in the classroom and at home. Your teacher will give you a handout about ways you can recycle items in your area. Discuss the list with your parents. Work as a family to reduce, reuse, and recycle.

D. Why Worry About the Solid Waste Problem

This section is up to you and your teacher.
Discuss what approach you want to use.
Some suggestions might be:

1. Write a story or poem about the solid waste problem and explain to the class why you should be concerned.
2. Write and act out a play concerning the solid waste problem.
3. Write simulated radio or television programs about the solid waste problem.
4. Read books, articles, or newsclippings about the solid waste problem.
5. Fix a bulletin board to relay the message.
6. What ideas can you come up with?
7. Read about new methods of disposing of solid waste.

TEACHER'S GUIDE

ACTION 4

Part A. The home survey of solid waste disposal should encourage students to begin recycling as many items as possible. You may want to start a collection center in the school room. The money collected could go to charity, or use it for equipment or supplies needed for the classroom. Check the handout sheet on recycling to find out where to take these valuable resources.

Part B. Discuss the various methods of disposal. Emphasize the need for recycling materials, instead of throwing everything away. Make arrangements for inviting a resource person to speak to your class. Resource people are listed in the section, Action 6. Information about disposal practices can be borrowed from the Title III Center. Ask a staff member for assistance.

Part C. Make sure students can come up with alternatives for solving the excess packaging problem. Letters explaining the alternatives and the concern for the problem can be directed to individual store owners, or companies involved. However, these letters should be factual and should avoid extreme criticism. Check into your own school problems: milk in cartons, food in plastic wrap, glass jars not recycled, etc.

ENVIRONMENT Idea I Land

ACTION 5

"Let's Go on a Field Trip!"

A field trip is to be taken during your teaching of the land unit. The field trip is an integral part of the land unit. It emphasizes the concepts learned, or to be learned by the students. On-the-spot observation is a valuable learning technique. Consult the "Teachers' Resource Handbook" for field trip dress, discipline, and general instructions.

A. Facts or Concepts?

Mind filling, factual, see-all field trips have been a traditional approach to the field trip in the past. The question is, "Is the child given any responsibility for learning on his own?" Does he retain more from being spoon-fed facts or from being allowed to learn from his own interest and involvement?

Experience and research indicate that children learn more when they become personally involved in the learning process. This can be achieved by allowing the child to participate in the initial planning of the field trip, and to select a specific investigation on the field trip for which he will be responsible. These specific investigations will be within the bounds of the concepts to be presented on the field trip and in the unit.

The concepts below are only a few of the many that students should come to understand when learning about the environment. Additional concepts may be emphasized at the teachers' discretion. The concepts to be presented are as follows:

1. Soil is a natural resource.
2. Man is dependent on the renewable resources for his survival.
3. Everyone has the responsibility for conserving the soil around him.
4. Living things are interdependent with each other and with their environment.
5. Change is the only constant of our environment.

B. Where Do We Go?

The above concepts can be illustrated at a number of field sites. The actual field trip site choice should result in a discussion with your students. Let the students feel a part of the final decision. Their interest will be enhanced by your concern over their choices.

Suggested field sites would include:

1. Local wooded area, e.g. Alton ravines; student's farm; school site nature area, etc.

2. City park or county owned property

3. Pere Marquette State Park; Beaver Dam State Park; other nearby state parks and recreation areas

C. How Do We Teach Concepts?

Three options are presented for the teaching of these concepts. These options vary in degree of the student's responsibility for learning. They vary from teacher planning activities for the student to student-teacher planning to total student planning. These options can be combined or used independently. The options are as follows:

1. Teacher Planning for Student

The teacher will present activities to be assigned to students or chosen by the students on a voluntary basis. The students should be encouraged to brainstorm additional activities to enlarge on those being suggested. The only caution would be to contain the brainstormed activities as they apply to the concept being taught. Those activities are listed following this section on teaching options.

2. Student-Teacher Planning

With this procedure the list of concepts is to be presented to the students for class discussion. The discussion should establish an understanding of these concepts. At this point the students should be guided into a brainstorming session to bring out field trip activities and assignments as related to the concepts. The teacher, in guiding the development of the field activities may care to provide some direction by giving suggestions of activities as they are listed at the conclusion of this teaching option section.

3. Student Planning

The student in this procedure will be totally responsible for his plan of study of the concepts given to him by the teacher. Initially, the teacher will work with the student in developing a study agreement. The study agreement will cover the following points:

a. title of study
b. questions to be answered in conducting the study
c. resources to be used
d. description of field activity
e. field activity equipment and supplies
f. method of recording data
g. form the report or summary will take (written-oral-audio & visual, etc.)
h. how and who will evaluate the report

The carrying out of the field activity may be either on a student self-directed basis on free time or as a part of the class field trip.

Suggested Field Trip Activities

Methods of procedure in carrying out these activities should be carefully planned and reviewed in preparation for the field experience. Considerations to be made are:

a. equipment or supplies needed to carry out the activity
b. method of recording the data to be gathered
c. method of recording the data in a meaningful way
d. follow-up activities that will extend and strengthen the concept

Concept 1 Soil is a natural resource

Activity - locate area of erosion, preferably gully erosion. Calculate how much soil has already been washed away by rainwater or wind. You will need string and/or a ruler depending on the depth of the gully. Have students work in pairs or groups to figure out how to measure the average depth and width to determine how much soil has been washed away. It is not important that they be accurate. It is important that they understand the idea that valuable material is washed away that cannot be replaced easily.

Locate an area that is similar in slope and terrain to the above site but where little or no erosion has taken place. Let the students study this area by feeling, smelling, and observing the area. Why does erosion not occur here? How has nature prevented erosion in this area?

Concept 1 (Cont.)

Take a survey of the surrounding area. How many places does erosion take place? What percent of the area is free from erosion? Is man the primary cause for this erosion? What positive measures can be taken to prevent erosion in this area? If arrangements can be made in advance, your class might take positive steps by tree planting; or, other steps can be taken to restore this particular area. You might investigate the possibility of putting ground cover on needed areas in the school yard after the field trip has been taken.

Concept 2 Man is dependent on the renewable resources for his survival.

Activity - combine study of renewable resources and solid waste disposal.

In a pre-determined area, have students list all the different resources and tell whether they are renewable or non-renewable. A chart for recording this information might be constructed before taking the field trip. If the area is littered, some of the list should include these items.

Divide the class into four groups. Divide the area into four specific areas. Have each group assume responsibility for collecting litter in their given area. After collection, have each group separate and determine the number or volume of each item. Determine whether any material is made of renewable resources. Illustrate the importance of recycling, using the materials over again, by starting a collection center at your school; or contact a community group which is working with recycling. You can use the money collected from environmental projects to purchase needed classroom materials. One school is using the money to construct a weather station on the school grounds. Another activity at this same site would be to survey the area for proper waste receptacles. Determine the needed locations of the receptacles by the amount of litter collected at specific points.

Concept 3 Everyone has the responsibility for conserving the soil around him.

Activity - illustrate aesthetic appreciation of the natural beauty that soil provides.

Divide the class into two groups. Group 1 - find area of natural beauty. Write a story, poem, song or draw a picture emphasizing the need for maintaining this natural area. Group 2 - find natural area that has been abused. Draw a picture or write a story, poem, or song emphasizing the need to restore this area to its natural beauty.

This activity must be planned exactly so that each student knows his role. The materials must be provided before leaving the classroom. Let the students express their creative abilities in this activity.

Composting leaves at home and school could be a positive step in showing the valuable materials that are returned to the soil.

Concept 4 Living things are interdependent with each other and with their environment.

Activity - instruct students to collect and observe one living thing (plants or invertebrates only) that is dependent on "something." Gather after ten minutes and have each student tell the group what he collected or observed, what it is dependent on, and what is dependent on the object collected. Before leaving the area, turn all animals loose and return logs and stones to original location. NOTE: Avoid collecting vertebrates as they are easily injured or frightened. A teacher or staff member may want to handle a vertebrate for demonstration purposes only.

Concept 5 Change is the only constant of our environment.

Activity - allow the students ten minutes to find as many examples as they can of change. Students should be divided in groups of five or six students. Specify the boundaries and check with each group periodically. Specific instructions should be given about what the students can pick up or collect. For example, wildflowers should be avoided unless they are common and plentiful. Invertebrate animals can be collected. The students will probably be loaded down with leaves, flowers and seeds. All the items collected probably can be grouped into five areas:

a. natural (species) - buds → flowers → seeds → dead remains
b. natural (caused by other living things) - chewed, sucked, mined leaves
c. physical - storm, erosion, flood, time
d. chemical - pH, mineral deficiency
e. man-caused - endless list

Children should decide that change is going on all the time.

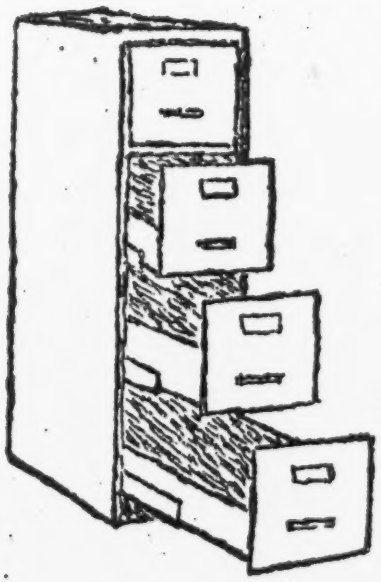
ENVIRONMENT Idea I Land

Action 6

"A Resource Key to Open the Mind"

Often teachers desire additional reading material, visual experiences or discussions to enrich a student's learning experiences. Listed below are materials which may be borrowed from the Environmental Project Center, area resource people, and free films. This listing, however, does not include resources which may be found in local school or public libraries.

A. Move Upward With the Vertical File



The Project Staff has accumulated and filed a number of pamphlets, newspaper clippings and magazine articles which are available to teachers for use as resource material. Teachers may borrow, for two weeks, a maximum of four articles from any one heading in the vertical file. Articles may be obtained by mail, by contacting one of the Project Staff or by calling the Project Center at 786-3313. The following headings appear in the vertical file.

1. Agriculture
2. Agricultural Pollution
3. Community Planning
4. Community Planning - Zoning
5. Conservation - Districts
6. Conservation - Soil
7. Conservation - Wildlife
8. Ecology
9. Forestry
10. Governmental Control - Federal - Pesticides

11. Hunting and Trapping
12. Insect - Control
13. Land
14. Landfill
15. Litter
16. Mines - Waste
17. Natural Resources
18. Pesticides
19. Plastics
20. Population
21. Recreation
22. Recreation - Illinois
23. Recreation - National Parks and Forests
24. Recycling
25. Soil
26. Solid Waste
27. Terrarium
28. Urbanization
29. Wildlife

B. Enough for Each Student

The Project Center also has multiple copies of certain resource materials which may be borrowed by a class. If the teacher desires, and it is possible, each student may study his personal copy of a pamphlet for a maximum of two weeks. Such bulk requests should be directed to the Project Staff.

All of the material listed below was obtained free of charge. The teacher or school librarian may obtain permanent copies for their building or classroom by directing requests to the following agencies.

1. "The Conservation Story, A Background for Understanding Today's Crisis"

   American Education Publications
   Columbus, Ohio

   Booklet includes some history leading up to the present environmental problems including case studies.

x

2. "CANS AND THE ENVIRONMENT"

American Can Co.
Greenwich, Conn.

Questions and Answers concerning solid waste and recycling.

3. "POLLUTION FACTS/REPORT #3"

Continental Can Company
St. Louis, MO

Presents statistics and graphs concerning all forms of pollution.

4. "WHAT'S THE LATEST WORD ON RE-USING GLASS"

American Trucking Assoc.
Washington, D.C.

Frank Blain interviews R. L. Cheney, Executive Director, Glass Container Manufacturers Institute.

C. Those Who Know

The following is a listing of possible resource people and their titles. You may want to contact one of these resource people about the possibility of speaking to your class. You may also want to contact your local high school concerning students qualified to speak to your class.

Jersey County

John Pero, Extension Administrator
Cooperative Extension Service, University of Illinois
405 South State, Jerseyville, Illinois Phone: 618-498-4821

Walden Lewis, Area Forester
Illinois Division of Forestry, Department of Conservation
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

David Harper, Game and Fish Biologist
Illinois Department of Conservation
142 Robert Street, Jerseyville, Illinois Phone: 618-498-4243

Tom Lamer, District Forester
Illinois Division of Forestry, Department of Conservation
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

George Lessig, Fire Warden
Illinois Division of Forestry
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

George Threldkeld, District Conservationist
U.S. Department of Agriculture
301 South Jefferson, Jerseyville, Illinois Phone: 618-498-3712

Ray Carter, Soil Conservation Technican
U.S. Department of Agriculture
301 South Jefferson, Jerseyville, Illinois Phone: 618-498-3712

Sue Wright, Park Interpreter
Pere Marquette State Park
Grafton, Illinois Phone: 618-786-3718

Dr. Paul Kilburn, Assoc. Professor of Biology
Principia College
Elsah, Illinois Phone: 618-466-2131

Sally Vasse
Audubon Society
Mark Twain Wildlife Refuge Phone: 618-883-2523

Madison County

Dr. Harry B. Kirchner, Assoc. Professor of Earth Science
Southern Illinois University
Edwardsville, Illinois Phone: 618-692-3620

Paul Hawkins, Madison County Sanitation Officer
Madison County Court House, Edwardsville, Illinois
Phone: 618-656-0913

Dale Sherrard, District Conservationist
U.S. Department of Agriculture
P.O. Box 482, Edwardsville, Illinois Phone: 618-656-4710

Dana Grantham, Soil Scientist
U.S. Department of Agriculture
P.O. Box 482, Edwardsville, Illinois Phone: 618-656-4710

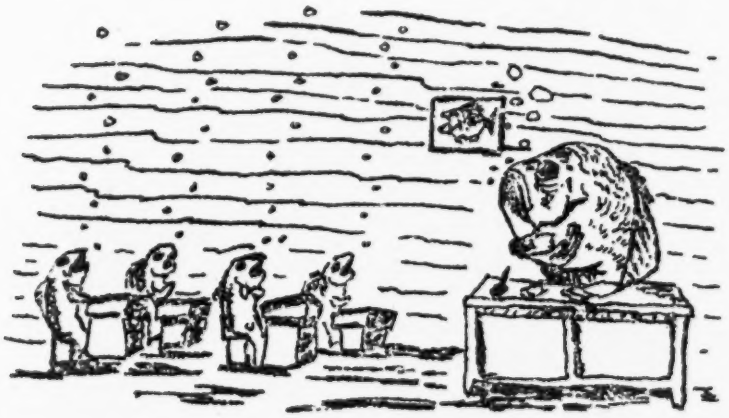
Melvern Allen, Conservation Engineer
U.S. Department of Agriculture
P.O. Box 482, Edwardsville, Illinois Phone: 618-656-4710

Dave Horn, Superintendent of Sanitation
Public Works Department, City of Alton
101 East 3rd. Street, Alton, Illinois Phone: 618-465-4226

Ralph Wandling, Director of Public Works
101 East 3rd. Street, City of Alton, Illinois
Phone: 618-465-4226

Pride Incorporated
Williams and West Broadway, Alton, Illinois
Phone: 618-465-3525

Norman Klueter, Chairman
Madison County Soil and Water District Committee
P.O. Box 482, Edwardsville, Illinois Phone: 618-656-7300



The Following Are Members Of The Alton Environmental Ecological Control Committee.

Dr. J. Edmund White, Head of the Department of Chemistry
Southern Illinois University, Edwardsville, Illinois
Phone: 618-692-2042

Cornell C. Brown, employed at Laclede Steel Co.
1118 Harrison Street, Alton, Illinois
Phone: 618-462-9821

Richard E. Brobst, Chemist at Olin Works
27 Holly Hill, Alton, Illinois
Phone: 618-462-7414

Nick Bono, engineer at WOKZ Radio
3105 Clay Street, Alton, Illinois
Phone: 618-462-0181

Francis Hogan, engineer at Owens-Illinois
3116 Burton, Alton, Illinois
Phone: 618-462-2365

Mrs. Laraine N. Rowse
807 Grove Street, Alton, Illinois
Phone: 618-462-7867

Marvin Mondy, biology teacher at Alton High School
1619 Seminary Road, Alton, Illinois
Phone: 618-462-7164

Robert Busse, Director of Parks and Recreation-Alton
Rock Springs Park, Alton, Illinois
Phone: 618-462-9711

Macoupin County

George Caveny, Macoupin County Board of Supervisors
R.R. Shipman, Illinois
Phone: 618-836-4706

Harley Briscoe
Soil Conservation Service
805 North Broad Street, Carlinville, Illinois
Phone: 217-854-6711

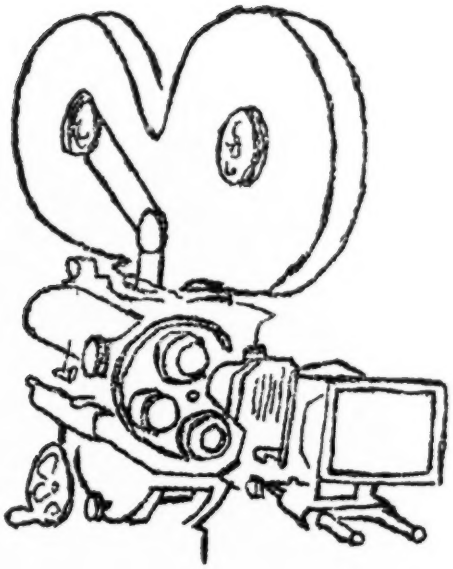
Harold Landon
Agricultural Stabilization and Conservation Service
805 North Broad Street, Carlinville, Illinois
Phone: 217-854-6711

Bill McAllister
Extension Farm Advisor
126 North Broad Street, Carlinville, Illinois
Phone: 217-854-5946

James England, Conservation Officer
Illinois Department of Conservation
R.R. 2 Carlinville, Illinois
Phone: 217-854-6461

Frank Simmermaker, Park Ranger
Illinois Department of Conservation
R.R. 2 Box 61 Plainview, Illinois
Phone: Shipman - 618-836-4871

D. "I See and I Remember..."



The following is a listing of free films which may be obtained if a teacher so desires. The films may be borrowed from the sources given below with the only cost involved being that of return postage. All films are in color except those designated by (*) asterick.

TITLE OF FILM	SOURCE OF FILM	LENGTH
"Bulldozed America" * (What happens when commercial interests destroy natural beauty)	Film Loan Service Michigan Department Natural Resources Lansing, Michigan 48926	25 min.
"Mud" (The story of urban erosion and sedimentation)	Environmental Education Specialist Jefferson National Expansion Memorial 11 North Fourth Street St. Louis, MO 63102	28 min.
"Grass Blade Jungle" (biology in the grass and shrubbery of a back yard)	Ill. State Museum Audio Visual Department Spring and Edwards St. Springfield, IL 62706 Phone: 217-525-6317	11 min.
"The Farm (Farm management for maximum wildlife)	Modern Talking Picture Service c/o Swank Motion Pictures, Inc. 201 So. Jefferson Avenue St. Louis, MO 63103	28 min.

TITLE OF FILM	SOURCE OF FILM	LENGTH
"Life in a Woodlot" (Life cycles of man, animals and plants are interrelated)	Ill. State Museum Audio Visual Department Spring and Edwards St. Springfield, IL 62706 Phone: 217-525-6317	17 min.
"The Meaning of Conservation" (built around a family picnic)	Same address as above	10 min.
"Plants Make Food" (Dependence of all Living things on Plants)	Same address as above	11 min.
"Vacant Lot" (ecology in vacant lot)	Same address as above	18½ min.
"A Way of Life" (predator-prey relationships)	Same address as above	28 min.
"Return to Eden" (attempts to solve problems of soil erosion)	Allis Chalmers Manufacturing Co. Tractor Photographic Group, Tractor Group Milwaukee, Wisconsin 53201	17 min.
"The Strands Grow" (all life is bound together)	Film Loan Service Division of Ed. Ill. Dept. of Conservation, State Office Bldg. Room 113 400 South Spring St. Springfield, IL 62706	25 min.